

## ARTICLE

# Race and the Ivory Tower: An Antiracism Exercise for an Undergraduate Neuroscience Classroom

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This article details an antiracism exercise completed in an introductory undergraduate neuroscience class. Students completed an online pre-class multimedia module entitled “Race and the Ivory Tower” covering racism in science and medicine, the neuroscience behind bias, and the impact of race and racism on health outcomes. The module included two videos, one podcast, and a peer-reviewed journal article, alongside several optional additional resources written for both academic and lay audiences. After completing the module, students participated in an open-ended online discussion followed by an anonymous survey to elicit feedback on the exercise. As a continuation of the antiracism exercise, students researched and reported on the work of a Black or nonwhite Hispanic/Latino scientist for a final project later in the semester.

Sixty-eight of 69 students participated in the discussion, and the majority discussed the neuroscience of bias and public health effects of racism. Most students also discussed the importance of the module contents or further

questions that they would explore. Sixty of 69 students answered the anonymous survey, where most students reported a better understanding of racism after interacting with the content. Additionally, most students felt better prepared to discuss racism in science and medicine and more able to identify unconscious bias. Finally, students reported that they enjoyed the module contents and online discussion.

Overall, this exercise effectively introduced students to the ongoing challenge of racism in science and medicine through both scientific and sociological lenses. Students recognized the collective importance of the content, which was our goal as they represent the future leaders in neuroscience and medicine and should be equipped to address leading issues within their field.

*Key words: racism; neuroscience; education; public health; unconscious bias*

Science, while claiming to be rooted in truth, rigor, and transparency, is not free of racial bias (Wingfield (2020); (Cell Editorial Team, 2020). As a discipline, neuroscience remains largely white and male, especially in more senior positions within academia. As a whole, underrepresented minorities make up 20% of pre-doctoral and postdoctoral trainees, but represent only 10% of the faculty across neuroscience departments nationwide (Society for Neuroscience, 2017). In general, scientists of color are underrepresented in faculty positions and receive less funding and support than their white colleagues despite greater innovation; indeed, research shows Black researchers typically need to write twice as many grant proposals to get the same level of funding as their white peers with similar academic achievement (Ginther et al., 2011; Stevens et al., 2021). Medicine mirrors these demographics, where minorities are underrepresented at similar rates in physicians (Association of American Medical Colleges [AAMC], 2019) and physician-scientists (Harding et al., 2017). These disparities will necessarily continue to contribute to white male voices being overrepresented, often at the expense of important minoritized voices, in science and medicine.

Racial disparities in health are also a serious and ongoing public health issue. Such disparities have been further elevated in public discourse by both recent protests for racial justice and the COVID-19 pandemic. Like every

major institution and system, science and academic medicine need to acknowledge, learn about, and work toward rectifying racial underrepresentation and injustice (Odekunle, 2020). Our students will become the next generation of neuroscientists and physicians. Lasting change requires education about inequality in science and willingness to discuss race and equity within our systems.

To address this within our student population, we developed an online module titled “Race and the Ivory Tower” designed to expose students to information about implicit bias, health disparities resulting from racism, the neuroscience of racism, and ongoing racism within science and healthcare. We aimed to recognize and include diverse perspectives of people in science and medicine, acknowledge where systemic injustice exists and is embedded in the structure of science and medicine, and share counter narratives in science and medicine—highlighting stories from the point of view of minorities rather than majority groups. As most students were on medical or scientific research career paths, the content is directly relevant to the career paths they will likely pursue. The online activity was conducted across two sections of an introductory neuroscience course in fall 2020. Upon completion, students were surveyed to measure their perceptions of gains as a result of engaging with the learning activity. Our report is designed to provide 1) an educator tool kit for the antiracism activity, and 2) a discussion of

additional curricular elements that modeled antiracist activity within an introductory neuroscience class.

## CLASS ACTIVITY DESIGN

### Participants

UAB is an urban, predominantly white institution with an undergraduate enrollment around 14,000 students. The racial/ethnic demographics as defined and compiled by the UAB Office of Institutional Effectiveness and Analysis for the fall 2020 campus census for full-time undergraduates reported the student body to be 40.6% White, 17.0% Black or African American, 6.1% Asian, >0.1 percent Hawaiian or Pacific Islander, 0.2% American Indian or Alaskan Native, and 4.8% Hispanic/Latino. Sixty-nine students were enrolled in two sections of Brain Science, an introductory neuroscience course, at the University of Alabama at Birmingham (UAB) during fall of 2020. The student population included in this report is as follows: Honors (30 students), 56.7% White, 3.3% Black or African American, 36.7% Asian/Pacific Islander, 3.3% Hispanic/Latino, 0% Multicultural; Non-Honors (39 students), 40% White, 12.5% Black or African American, 27.5% Asian/Pacific Islander, 12.5% Hispanic/Latino, 5% Multicultural, 2.5% Not reporting (Figure 1A). All but four students (65/69) were part of the UAB Honors College, thus the student population even in the regular section was still overwhelmingly honors students.

Both sections met on Tuesday and Thursday in a hybrid format where half of the class attended in person and the other half attended via Zoom video conferencing services. Students had the option to participate fully online and those who attended in person one day a week attended virtually the other day of the week. The sections consisted of 30 students in an honors section and 39 students in a regular section. In the honors section, the academic programs of students were as follows: 23 of 30 students were neuroscience majors, three of whom were double majors with another discipline, four majored in biomedical sciences, one in biology, one in psychology, and one in genetics. In the regular section, 35 of 39 majored in neuroscience, three

of whom were double majors, and the remaining four majored in biology. Most were in their second year of college, though the honors section had more who were classified as juniors, likely due to more credits completed rather than being in the third year of college (Figure 1B). Most students were pre-medicine and most engaged in a mentored research experience in a NIH-funded laboratory on campus.

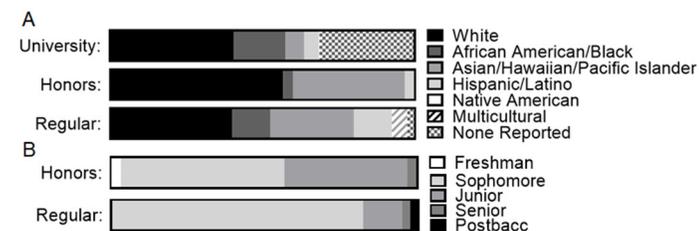
### Course Content Overview

The introductory neuroscience course covers the basic structure and function of the nervous system. Students learn about fundamental concepts in neuroscience spanning the action potential, synaptic transmission, select sensory systems, movement, sleep, stress, and memory. The course is designed as a flipped classroom. In-class activities include a wide range of learning approaches, including case studies, hands-on work with anatomy models, jigsaw presentations, and interactive material reviews. Assessments include pre-class quizzes, written case study conclusions, exams, and anatomy practicals. Prior to introducing the Race and the Ivory Tower Module, students complete a module on biomedical research ethics and the Tuskegee Syphilis Study. At the end of the semester, students completed a final project writing and presenting on a scientist of color.

### Race and the Ivory Tower Module

The activity was introduced in week eleven of a fifteen-week term. Students were given one week, including one Tuesday class period of one hour and fifteen minutes, to complete a multimedia module about topics related to the neuroscience of racism, racism in science and medicine, implicit bias, and health disparities resulting from systemic racism. Module contents included the following required media:

- A six minute video about the science of racism, including the effects of racism on mental health, stress, sleep, obesity, and asthma made by YouTube Creators for Change. (AsapSCIENCE, 2018)
- A fifty minute podcast on implicit bias introducing students to the concept and explaining the Harvard Implicit Association Test (IAT, a tool to assess personal bias) The podcast was titled *The Mind of the Village* from NPR's Hidden Brain Podcast (Vedantam, 2018), and linked out to the IAT
- A ten minute video by neuroscientist Larry Sherman explaining the neural processes underlying visually-based decision making and how it relates to prejudice titled "You and Your Racist Brain: The Neuroscience of Prejudice" (The Royal Society of Victoria, 2018)
- Cell Press Editorial – *Science Has a Racism Problem* (Cell 181, June 25, 2020)



**Figure 1.** Demographic and Student Classification Data. **A.** Graphical representation of student demographics at UAB, in the honors section of NBL230, and in the regular section of NBL230. **B.** Graphical representation of classification for the honors and regular sections. The honors section consisted of 1 freshman, 16 sophomores, 12 juniors, and 1 senior. The regular section consisted of 32 sophomores, 5 juniors, 1 senior, and 1 postbaccalaureate. Proportion of students with a given classification are indicated with the corresponding shaded bar.

After completing the required content, students were asked to engage with elective content from both academic and popular sources. We included both types of source

material as we predicted that some students would challenge premises presented in the required content and want to learn more from scholarly review articles, while others would accept premises presented in the required content and want to expand learning into other related topics. Students were asked to explore 3-5 of the following elective content items based on what interested them:

#### Peer-Reviewed Articles and Reviews

- Abiodun SJ (2019) "Seeing Color," A Discussion of the Implications and Applications of Race in the Field of Neuroscience" published in *Frontiers in Human Neuroscience* (Abiodun, 2019)
- Kubota JT, Banaji MR, & Phelps EA (2012). "The neuroscience of race" published in *Nature Neuroscience* (Kubota et al., 2012)
- Amodio, D. (2014) "The neuroscience of prejudice and stereotyping" published in *Nature Reviews Neuroscience* (Amodio, 2014)

#### Content Developed for Lay Audiences

- Podcast: *The Air We Breathe: Implicit Bias And Police Shootings* from Hidden Brain by NPR.org that further explores the role of implicit bias in police shootings of black men (Vedantam, 2020c)
- Podcast: *Rap on Trial: How An Aspiring Musician's Words Led To Prison Time* from Hidden Brain by NPR.org that further explores the bias against rap music as a function of racism (Vedantam, 2020a)
- Podcast: *People Like Us: How Our Identities Shape Health And Educational Success* from Hidden Brain by NPR.org exploring social science research on the impacts of shared racial identity between healthcare providers and patients (Vedantam, 2020b)
- Blog: *Black Voices in Medicine-* a series of perspective pieces published by Black physicians about their experiences with racism in healthcare (Medscape, 2020)
- Op-ed in USA Today published by Black leaders in medicine about ongoing health disparities and intersections with the COVID-19 pandemic (Vickers, April 10, 2020)

All module content is cited in the references list with links included where appropriate. Whenever possible, we selected content from Black creators and other people of color. In the Thursday class period held during the student interaction with the "Race in the Ivory Tower" module, instructors discussed the Tuskegee Syphilis study, the resulting Belmont Report, and its impact on biomedical research ethics. We mention this, as some responses include information related to that content though it was not covered explicitly in the "Race and the Ivory Tower" module.

#### Assignment

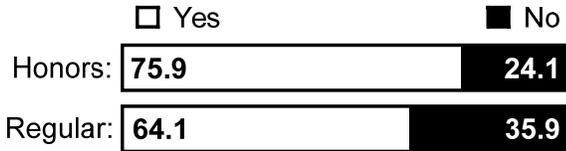
After completing the module, students were asked to participate in a virtual discussion. Specifically, they were asked to reflect and react to the module content by writing a

two-paragraph discussion post in our learning management system (Canvas). After they posted, they could then comment on a minimum of two other posts. The instructor stated that the content of the posts was not graded, only participation. After the semester ended and final grades were submitted, we read through the comments to quantify the proportion of students who explicitly discussed learning about the neuroscience of bias (e.g., commenting on brain areas activated when confronted with racism) and the impact of racism on health outcomes and the resulting disparities, two of the topics that we wanted the students to be aware of as future neuroscientists and physicians. Only the responses to the prompt were analyzed for content, not the commentary on other posts.

The instructors coded the student responses. We started by looking for responses referencing common themes in the material (e.g., bias and its neurological basis, racism in academic medicine) and saw that there were three common themes discussed by students: Neuroscience of Bias, Racism as a Public Health Problem, and the Value of Covering the Material. Thus, we quantified the proportion of students who discussed each of these three topics in each section of the course. For the Neuroscience of Bias, we counted students who discussed specific brain areas that are activated differently in response to seeing different races, connected the ideas of neuroscience/brain/biology and racism/bias, or how understanding the neurobiological components of bias can help people acknowledge implicit biases and actively work to counter them. For Racism as a Public Health Problem, we counted students who discussed disproportionate impact of race on health outcomes, how the history of discrimination in medicine impacts doctor-patient relationships today, and how long-term effects of racism or bias impacts individual health. For the Value of Covering the Material, we counted students who stated that the material was important, or they were glad it was covered in the class, and those who indicated they wanted to learn more outside of the activity. Examples of these comments are given in the Activity Results section. Responses were tabulated in Microsoft Excel. Absolute values of student responses to each qualifier category were calculated as a percentage of the number of students who responded to the prompt.

#### Survey

In the class period after the discussion assignment was due, students were given in-class time to access a brief five question survey about the learning activity. The instructor announced prior to distributing the survey that participation was voluntary, and that survey participation had no bearing on the graded assignment (the discussion post). Answers were collected via an anonymous distribution link in Qualtrics and distributed through Zoom chat to all students in the class. The survey link remained open for the full hour following class. Students were given a series of 7-point Likert scale questions related to their perception of the activity. Specifically, students were asked to rate their 1) understanding of racism from a scientific perspective, 2)

*Students who mentioned neuroscience of bias*

**Figure 2.** Student Discussion of Neuroscience of Bias. Graphical representation of percentage of student who discussed the neuroscience of bias in their initial discussion post. Twenty-two of 29 students in the honors section discussed the neuroscience of bias while 25 of 39 in the regular section did.

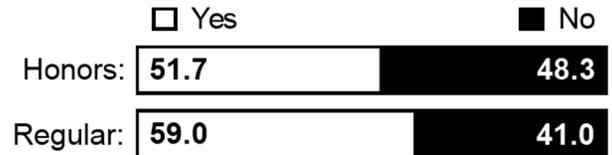
understanding the health-related implications of racism, 3) confidence discussing race and social justice issues with peers, 4) unconscious biases, and 5) enjoyment of activity. The Likert scale survey asked them to select a value of 1–7, where 1 = strongly agree, 2 = agree, 3 = somewhat agree, 4 = neither agree nor disagree (denoted “neutral” in graphical representation of data for space constraints), 5 = somewhat disagree, 6 = disagree, 7 = strongly disagree. After the survey link closed, responses were tabulated in Microsoft Excel. Absolute values of student responses to each qualifier category were calculated as a percentage of students who completed the survey. The survey and its use were evaluated and exempted by the UAB Institutional Review Board.

### Final Project

At the end of the semester, the students completed a final group project: researching a Black or nonwhite Hispanic/Latino scientist and introducing the class to their contributions to science, career, and personal biography, with an emphasis on scientists affiliated with UAB. This project was one of the primary differences between the honors and regular section. Both consisted of a written portion and a presentation portion, but the requirements for each were different between the sections.

The honors section read a scientific paper written by a scientist of color from a list generated by the instructors and analyzed the experimental design and hypothesis testing described in that paper. The students were pre-assigned into groups and given a list of ten papers. The demographic information of the scientists selected for the instructor generated list is as follows: 3 Black males, 4 Black females, 2 non-White Hispanic/Latino Males and 1 non-White Hispanic/Latina female. They compiled a written report of how the authors tested their hypothesis, alternative approaches to test the hypothesis, reasons why authors may not have attempted the alternative approaches. They then created a PowerPoint presentation detailing the paper’s hypothesis testing and introducing the class to the selected author’s life and contributions to science.

In contrast, the regular section focused not on experimental design, but instead on the life and career of a scientist selected from the list of *100 Inspiring Black Scientists in America* presented by Cell Mentor

*Students who mentioned racism and public health*

**Figure 3.** Student Discussion of Racism and Public Health. Graphical representation of percentage of student who discussed the racism and public health in their initial discussion post. Fifteen of 29 students in the honors section discussed the neuroscience of bias while 23 of 39 in the regular section did.

(Hinton, 2020). They were assigned to write a short Wikipedia-style summary of the scientist (or add to the Wikipedia if one already exists for their scientist) and then present the life and contributions to science of the selected scientist to the class. Final presentations were done in groups of 4 in the honors section and groups of 5 in the regular section. We used the final exam period of the class, which was an extended period of 2.5 hours as opposed to our regular one hour fifteen-minute section. Each group presented for approximately fifteen minutes (10 groups per section). In both sections, groups submitted their PowerPoint slides and written document to our learning management system in advance of their presentation and were provided a presentation grading rubric in advance of their presentation.

## ACTIVITY RESULTS

### Discussion Content

Sixty eight of 69 students enrolled in the course participated in the online discussion (98.6% response rate). Participation in the discussion was defined as providing one two-paragraph reflection post and responses to at least two other student’s posts. Student responses frequently referenced the neuroscience of bias (Figure 2) and racism as a public health issue (Figure 3).

### Students Learned About Neuroscience of Bias

One of the most cited themes in the discussion activity was the neuroscience of bias. This was defined as referencing specific brain areas involved in bias, and that there is a neurological basis for bias as covered in the module contents. About 76 percent of students in the honors section, and 64 percent of students in the regular section referred to the neuroscience of bias (Figure 2).

Below are six comments from unique initial student discussion posts that serve as representative sentiments expressed regarding the neuroscience of bias:

“I was surprised how deeply involved neuroscience was in racial prejudice especially when the amygdala signaled a response of fear for some people before the fusiform gyrus was able to signal for facial recognition. I saw how racial prejudice could be deeply rooted literally deep in our brain, affecting people’s thoughts

and actions directly.”

“I think this module was exceptionally beneficial to understanding racism and racial prejudice in a biological aspect.”

“I think it is important that people know although they may not be threatened or feel negatively against minorities it does mean [sic] they have no implicit bias.”

“The first step in overcoming irrational fears and biases, not just in race but about gender and other factors, is to acknowledge it. Understanding that these biases exist can allow us to look past them and better understand that embracing the success and joy of people who may not look like us or believe what we believe actually provides a greater benefit to society than not.”

“I found the results of the [Harvard Implicit Association Test] to be shocking, especially the part where people who were black also had a harder time associating 'black' with 'good.' It is appalling to think about the potential harmful impact of this false perception on the lives of individuals, especially if this viewpoint is shared and thus confirmed in subtle ways within the larger community.”

“I thought it was interesting how The Science of Racism and Dr. Sherman's video presented two different viewpoints about the origin of racism within people. I think it kind of ties into the age-old "nature vs nurture" [sic]debate, but ultimately I think that both implicit biases and learned biases are factors in developing racial prejudices.

**Students Learned that Racism is a Public Health Problem**

Additionally, the issue of racism as a public health concern was commonly discussed. This was defined as discussing race’s role in negative health outcomes or inequities in healthcare. The majority of students in both honors (51.7%) and regular (59%) sections of the course indicated awareness of the negative impacts of racism on determinants of health (Figure 3).

Below are six comments pulled from six unique initial student discussion posts that serve as representative sentiments expressed regarding ways that racism impacts public health and/or healthcare:

“The most surprising information from the module to me was the impact of chronic discrimination on the human body. As we have discussed in this class, stress responses send our bodies into overdrive and chronic stress can have damaging effects on our bodies. The threatening nature of discrimination and bigotry has apparent physiological effects on those being discriminated against AND those who are doing the discriminating.”

“As we saw in the Tuskegee Syphilis Study: in a field dominated by racial disparity, advocating for better and more affordable healthcare for minority groups is extremely important. (Especially in the middle of a global pandemic that is disproportionately affecting African Americans.)”

“Some things that I learned while reading the articles were that racism not only causes mental health problems but then those mental health problems lead to severe health disparities.”

“I was sad to hear that as many as 50% of white medical school students and medical residents still believe in false biological differences between white and black patients, like for example that black patients are more pain tolerant.”

“People of color have always been vulnerable in the doctor-patient relationship. Given that healthcare is one of the most intimate and impactful services available, the subsequent lack of trust has led black communities to be suspicious of medical institutions.”

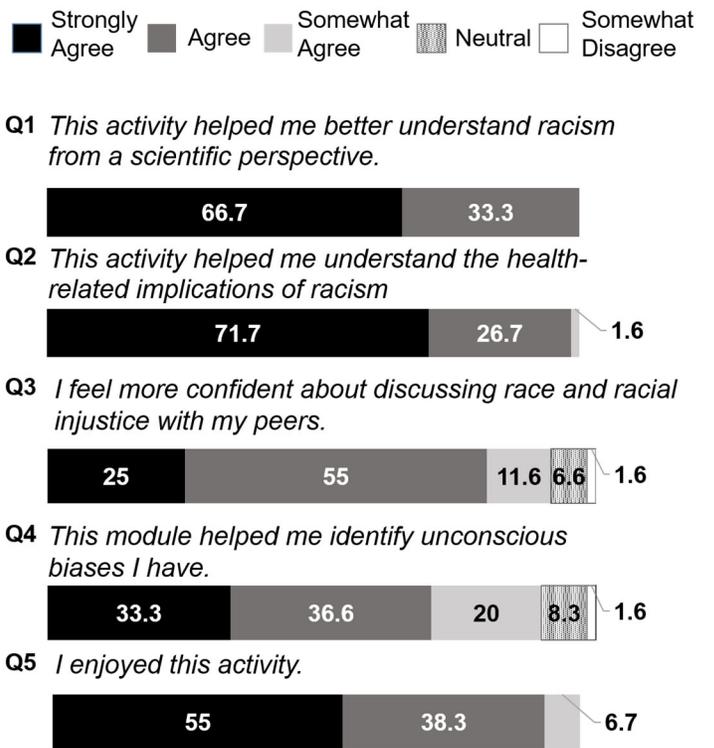


Figure 4. Student Survey Response Data. Graphical representation of a student self-assessment survey given in response to the “Race in the Ivory Tower” exercise. Percentage of students who chose that response are indicated numerically as percentages within the corresponding shaded bar. No student chose the response “Disagree” or “Strongly Disagree” so those choices were excluded from the representation for ease of reading.

### Students mentioned value of covering the material

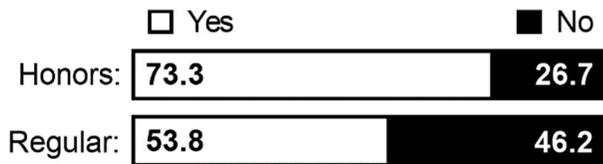


Figure 5. Student Discussion of Value of this Exercise. Graphical representation of percentage of student who reported that the information was valuable and had further questions. Twenty-two of 29 students in the honors section discussed this while 21 of 39 in the regular section did.

“While racism is not the sole reason for the health inequity of COVID-19 victims, baseline inequalities in our health system are a significant contribution to the impacted individuals from minority groups due to no access to healthcare, lower quality clinical care, etc. In general, racial and ethnic minority patients have more at-risk jobs and have less insurance coverage, so they must pay high rates to even be treated.”

### Survey Results

Sixty of the 69 students enrolled in the course responded to an anonymous five question survey about the module and discussion activity (87% response rate). Students reported that they learned about the science behind racism, its impact, and that they were better prepared to discuss these issues. Additionally, all responders reported enjoying the activity (Figure 4).

### Students Responded Positively to This Module

Beyond enjoying the material, many of the students reported in their discussion posts that the material was valuable and discussed further questions they wanted to explore (Figure 5). This resulted in the largest split in responses between the honors section and the regular section, as 76% of the honors section reported the module's value while 54% of the regular section did. This was likely due to the depth of responses between the two sections, where the honors section's responses were generally longer with more questions.

Below are four comments pulled from four unique initial student discussion posts that serve as representative sentiments expressed regarding the value of covering the material:

“I am relieved that I can have a mature conversation with my peers about this topic, it is how we learn and grow.”

“I am very thankful that we took time in this course to discuss race and racism in the context of science and life. As a white person, I have always felt that my role in the talk about racism was to listen or be a shoulder to lean on.”

“Overall, I really enjoyed this module and added several books to my reading list to continue learning about how

to fight racism, not only in the community but in myself as well.”

“The information that I learned from this module was very educational, and I'm glad that I'll be able to take what I have learned into consideration when approaching science and medicine.”

Centering the perspectives of minoritized groups is a central tenant of anti-racist behavior, as it shifts control of the narrative to those most impacted by racism. We want to conclude the description of this activity by centering the voices of several students who self-identified as Black in their discussion posts. We want to recognize that these activities can be challenging for Black students, who are often in the minority in pre-science and pre-medicine classrooms. Below are several comments from Black students:

“One thing I want to begin with is that it is hard for me to do assignments like this one. I believe that everyone should understand the importance of black lives in every way, shape, or form and it is very difficult to be required to remind others that black people are still so poorly misrepresented, discriminated against, and belittled in this world... I think these concepts should be taught to educators, people of power, and especially young students. By addressing the implicit bias of these major groups, we are able to help fight against the ingrained bias that is useless in society today.”

“[R]eading about the things black women and other minorities go through in the neuroscience field makes me want to find something that I would be passionate about and go into neuroscience research; as well as the neurosurgery career I initially wanted to go into in the first place; and be one of the minorities that drives equality in the field.”

“As an African American woman, my credentials are just as valid as the next person.[sic] Therefore, I shouldn't have to fight for recognition, I shouldn't have to protest so that I can receive the grants as my white peers. As much as it angers me, it inspires me to continue being a voice for those that will come after me. It give me peace knowing that this issue is not just being swept under the rug but people acknowledge that this is a real issue and something has to be done.”

### DISCUSSION

As there is a large pre-health and pre-science constituency in our program (>90%), we felt it important to present social justice issues through the lens of science and medicine, and to explicitly discuss the negative impact of racism in our field. Thus, we introduced a module covering the science of racism, implicit bias, and the public health impacts of racism and bias. Overall, it was well-received by the students. Most agreed that they had both learned from and enjoyed

the inclusion of the module in the context of the larger course. Many (>80%) of the students who take the course pursue professional school (medical, dental, optometry) or doctoral training after graduation, so they represent the future leaders of science and medicine, so it is important that they critically engage these subjects.

One of the mandatory module components assigned to students was the Cell Press Editorial *Science has a Racism Problem* (Cell Editorial, 2020) that closes by stating, "Science has a racism problem. Scientists are problem solvers. Let's get to it." In this vein, we decided to bring the social justice movement to our neuroscience classroom. We developed a module and subsequent activities to address ongoing issues with systemic racism in science and medicine by modeling antiracist behavior in the classroom; specifically, by explicitly identifying the problem of racism in academia, providing education on implicit bias (Carnes et al., 2012), elevating the voices of historically underrepresented leaders in science (Killpack and Melón, 2016), and modeling productive discussion about race and inequity amongst peers (Murrar et al., 2020). Racism is relevant to science and medicine and will likely be relevant as trainees continue in their careers, so it is paramount to address its impact early and often (Devine et al., 2012) to promote positive change and foster a sense of belonging for underrepresented groups (Rainey et al., 2018). While implemented in an undergraduate neuroscience course, this educational module could be easily adapted to any biomedical science course, and it could be scaled to serve students at various stages of training from high school to graduate students.

If others choose to adapt portions of this activity, we have two recommendations that were at the forefront of our planning. First, it is important to integrate antiracist content throughout the course, not just as a standalone module. Social science research supports this model, as evidence exists that overcoming prejudice is both a long-term process and one that requires effort to overcome bias (Devine et al., 2012). Easy ways to incorporate this content into neuroscience courses is to highlight scientists and physicians from historically minoritized groups through the topics covered in the class (Linden et al., 2020), and to integrate discussions of race and bias into sections on biomedical ethics and final projects. Second, we recommend tailoring (when possible) cases or vignettes used in the class to the student population and/or community examples. The concept of active learning is largely based upon the educational theory of 'constructivism', which centers the learner and their lived experience as the framework in which learning occurs (Bonwell and Eison, 1991). Furthermore, active learning increases performance in science subjects (Freeman et al., 2014) and reduces the achievement gap for minoritized groups (Haak et al., 2011). Thus, for maximum impact and inclusion, the material chosen should be student-centered, meaning culturally accessible and personally relevant to the student. Using such strategies drives critical thinking skills by capitalizing on student interest and broader

understanding of personally relevant topics (Elliott et al., 2016). For example, we chose to follow the "Race in the Ivory Tower" exercise with a study of the Tuskegee Syphilis Study in our medical ethics module not only because it contributed to the Belmont Report, but also because the study was conducted in the same state as our university. Unfortunately, the effects of institutional racism can be found in other states and countries, so we recommend introducing students to examples that are relevant to them beyond just the nationally recognized examples. As another example, we chose to emphasize scientists of color who had connections to our university in the module material (USA Today Op-ed from our medical school Dean, Dr. Selwyn Vickers) and in the final project. Both of these recommendations help bring the material closer to home for students, especially those who either do not recognize its importance or relevance. Thoughtful and intentional adaptation of this content will maximize student engagement and learning and better prepare them to combat racism going forward.

There are other reflections to be had about our activity and results. First, the activity was largely conducted online (except for final presentations), which creates a certain environment for discourse. The COVID-19 pandemic led to hybrid courses and required us to design modules with the flexibility to be completed entirely online. The online record of the discussion made it easier to collect and analyze the responses as data. It may also have encouraged students to maintain respectful discussion. In contrast, the online format of the discussion could also have restricted the topics discussed and the manner in which they were discussed. Recent reports indicate that students largely prefer in-person discussion over virtual alternatives, despite consistent performance in both situations (Kemp and Grieve, 2014). If any educators adapt this activity to an in-class discussion, we recommend establishing ground rules for respectful, productive discourse. Many university centers for teaching and learning have useful guides for moderating high-stakes, controversial discussions available online. Another consideration related to this topic is that the current events of 2020 could have predisposed our student population to engage positively with the material. Indeed, the salience of protests related to the Black Lives Matter movement and the health disparities uncovered by the COVID-19 pandemic may have primed students to be more responsive to the ideas of systemic racism in science and medicine than in other semesters when these issues were less visible. However, we feel that this content will remain relevant and that by focusing on the science of bias and presenting the evidence of racially based health disparities provide a foundation of fact to prevent societal (learned) racism. Regardless, it is important to moderate in-person or online discussion to ensure that it is respectful and productive, and to continue to highlight the ongoing relevance of racism in science and medicine.

It is important to acknowledge that as both authors are white, we have inherent power over conversations in class due to both our position as teachers and our race. Because

of this power differential, it is even more important that we are willing to explicitly discuss racism in science and medicine (Killpack and Melon, 2017). It is easy to avoid the subject entirely out of fear of misspeaking, misrepresenting the data, centering our own voices, or the responsibility for managing difficult conversations. However, as leaders in our own classrooms and community citizens of our universities, we argue that we have an obligation to actively model antiracist behaviors to dismantle systemic racism in the systems we participate in (Clark and Hurd, 2020). It follows that we must use our privileged position to effectively address the problems that exist. Mistakes such as those outlined above will happen, but we must have the humility to accept corrections from students, peers, and experts in the field and integrate those corrections into the material going forward. Finally, we must listen to and center voices of color who are experts on education, neuroscience, and medicine over our own and actively improve the course to encourage students to learn and engage best.

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Received July 16, 2021; revised September 10, 2021; accepted September 20, 2021.

This work was supported by The Undergraduate Neuroscience Program at

The University of Alabama at Birmingham (UAB). The authors thank Mrs. Caran Kennedy for her assistance in manuscript preparation and the students in Fall 2020 NBL 230 D&E for their participation in and feedback on this lab exercise.

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